



IMPACT OF CIGARETTE SMOKING ON HAEMATOLOGICAL PARAMETERS: A PROSPECTIVE STUDY

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ABSTRACT

Background: Although tobacco has dangerous effect on human health, still it is highly consumed throughout the world. Nicotine is used in different forms which include smoking as well as smokeless powder. Numerous educated and uneducated young people are addicted to tobacco use. **Aim:** To evaluate the effect of cigarette smoking on various hematological parameters between smokers and non-smokers. **Methods:** 120 male individuals (60 subjects without any habit and 60 smokers) participated in the study. Hematological parameters such as hemoglobin, RBC count, WBC count and differential leukocyte count (mainly neutrophil) were investigated. **Results:** Findings reveal significant increase in hemoglobin, RBC count, WBC count and Neutrophil count in smokers. **Conclusion:** Smoking has negative effect on various hematological parameters and thus associated with a wide spectrum of health complications.

KEYWORDS: Tobacco, Smoking, Hematological Parameters.

INTRODUCTION:

According to the data provided by World Health Organization (WHO), nearly 8 million people die worldwide every year due to diseases related to tobacco. Out of these, more than 7 million people die due to direct tobacco use whereas more than 1.2 million deaths are the result of non-smokers being exposed to passive smoking. Cigarette smoking is the most common form of tobacco use globally.

Various studies had postulated that smoking has adverse effects on health of an individual. Cigarette smoking is considered as one of the predisposing factors for the development of various diseases such as periodontal disease, gastrointestinal diseases, metabolic syndromes, pancreatitis, cancer and chronic obstructive pulmonary disease (COPD) which comprises emphysema and chronic bronchitis.^[1]

Cigarette smoking is also associated with an increased risk of cardiovascular diseases such as stroke, ischemic heart disease, atherosclerosis, myocardial infarction and coronary artery disease. In smokers, the exact mechanism behind the occurrence of such disease is unknown. It is thought that such type of effects are a result of infection and inflammation, oxidative stress, abnormalities in the blood and alterations of fibrinolysis and antithrombotic system.^[2]

The present research is a comparative work, which evaluates the effect of cigarette smoking on hematological parameters such as hemoglobin, RBC count, WBC count and differential leukocyte count (DLC) between healthy individuals without any habit and asymptomatic cigarette smokers.

MATERIALS AND METHOD:

The present research work was conducted in dental college in Greater Noida, India. 120 male individuals within age group of 18-30 years participated in this study. Study subjects were divided into two groups (**Group 1{control group}:** - consisting of 60 healthy individuals without any habit, **Group 2{smokers}:** - 60 individuals with smoking habit). Smokers without any evidence of recent or chronic illness were included in this study. Individuals having other habits such as tobacco chewing, usage of gutkha and alcohol consumption were excluded from this research work. Consent form was signed and submitted by each participating subject.

Hematological parameters i.e. hemoglobin, RBC count, WBC count and differential leukocyte count (mainly neutrophil) were evaluated in both the groups and compared statistically. Hemoglobin was measured through Sahli's hemoglobinometer whereas RBC and WBC count were measured by manual method with the help of Neubauer's chamber. The Peripheral differential leukocyte count was performed by manual method (spread technique). Tests were conducted by two independent observers for accuracy in result. Collected data was subjected to student's t-test for statistical significance and analysis was done by SPSS version 20.

RESULT:

Hematological parameters i.e., Hemoglobin, RBC count, WBC count and differential leukocyte count (mainly neutrophil) were calculated in 60 healthy individuals without any habit and 60 smokers. These parameters were compared in both the groups statistically. Hemoglobin count was found to be highly increased in smokers when compared to control group (healthy individual without any habit) and gave statistically significant result (Table 1). Similarly other parameters i.e. RBC count, WBC count, neutrophil count were also elevated in smokers when

compared with control group (Table 1).

Table 1: - Table depicting comparison of hematological parameters i.e. Hemoglobin, RBC count, WBC count, Neutrophil count between group 1 (control group) and group 2 (smokers)

HP	GROUP 1- CONTROL			GROUP 2- SMOKERS		P- VALUE
	TN	M	SD	M	SD	
Hb	60	13.99	.999	18.58	1.184	.000
RBC	60	5.725	.4693	8.323	1.0535	.000
WBC	60	8435.00	1533.5	1.46x104	1786.588	.000
N	60	63.70	2.486	74.23	3.367	.000

Here HP, TN, M, SD, Hb, RBC, WBC, N are hematological parameters, total number of individual, mean, standard deviation, hemoglobin, red blood cell count, white blood cell count, neutrophil count respectively.

DISCUSSION:

Cigarette smoking causes adverse effect on various hematological parameters. Around 4000 compounds are present in tobacco smoke, which cause adverse effect on human health. Among these carbon monoxide, free radicals and nicotine are mainly responsible for pharmacological effects.^[3] Carbon monoxide (CO) can quickly diffuse across alveolar capillaries and binds to Hb firmly. Further, it results in the formation of Carboxyhemoglobin (HbCO), a foremost cause of tissue hypoxia, which results in significant increase in RBC count.^[3]

In smokers, increased hemoglobin concentration is supposed to be mediated by carbon monoxide exposure. Some of the scientists suggest that increased hemoglobin level in smoker's blood could be a result of compensatory mechanism.^[2] Carbon monoxide binds to Hb and further it forms carboxyhemoglobin, which is an inactive form of hemoglobin with no oxygen carrying capacity.

Carboxyhemoglobin shifts the Hb dissociation curve in the left side, which results in decrease in the capacity of Hb to deliver oxygen to the tissues. In order to compensate with decreased oxygen delivering capacity of Hb, smokers maintain high level of hemoglobin as compared with non-smokers.^[4]

In smokers, WBC count increases due to release of nicotine-induced catecholamines. Cigarette smoke acts as an irritant and results in inflammation of the respiratory tree. This is one of the contributory factor for the increased leukocyte count in smokers.^[5] In addition, it has been proposed that bronchial tract stimulation under inflammatory response induces an increase in inflammatory markers in the blood circulation.^[6] In the present study neutrophil count was highly increased in smokers. In order to combat the inflammatory response caused by the smoke of cigarette in the bronchial airway, extracellular proteolytic enzymes were produced by the neutrophils which in excess lead to damage of the normal resident cells.^[7]

CONCLUSION:

Tobacco use in any form is most important factor, which causes alteration in hematological parameters. Negative effects of tobacco use may increase the possibility of developing other health related complications like respiratory dis-

eases, cardiovascular diseases, diabetes etc. Smoking or use of other tobacco products by the subjects should be taken into consideration when evaluating hematological profile to avoid possible misleading interpretations.

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